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ABSTRACT

This review of the literature examines the relationship of information needs and uses and explores some of the factors that influence the relationship. The paper begins with a review of ways that the terms "information and information need" and "information use" have been defined in the literature. It then identifies and discusses three approaches to conceptualizing user-oriented research on needs and uses: (1) the anomalous states of knowledge (ASK) approach of Belkin's model; (2) the value-added model proposed by Taylor; and (3) the sense making model (Situation-Gaps-Uses) proposed by Dervin. The impact of the context on information use is then explored using the professional settings of scientists, engineers, and executives as examples. Factors affecting information needs and use at the individual level are also explored, including users' cognitive skills, attitudes, and motivation, as well as market segmentation, information seeking behavior, user needs, and organization structure, climate or culture, policies, and environment. A proposal for conceptualizing the relationship of information needs to use and some suggestions for future research conclude the paper. (Contains 52 references.) (KRN)

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Information Uses: Relating Information Needs to Information Uses in Specific Contexts

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Problems and Issues

"The prevailing theory of information need and use is that human beings need information in order to reduce the ambiguity in their environment and that they use information to impose some structure on an unstructured 'event world'... One theoretical view is that the world we live in is an orderly place, and information is a means to describe a portion of that order. Another view is that the world around us is random, and that we use information to reduce our sense of disorder so that we can cope with the randomness. In either case, information is a tool, not an end."

- Sara Fine (1984, p.445)

The ultimate goal of research in human information behavior is the hope to provide and transfer the 'right' information to the right people at the right time through better, more effective information services and system design. The first step toward this goal is to understand where human needs of information come from. In order to answer this question, one also needs to answer what is an information need. Next, one has to ask: how do people fulfill their information needs? In an information society, one of the important questions to ask is how people use information to fulfill such information needs, since in a generic sense, the value of information can only be realized through utilization.

Information need and use studies have a long history in the library and information literature as part of user studies. Although the literature of user studies continues to grow, the major criticism has been that it is descriptive or exploratory in nature. A recurrent theme which appears in recent user studies literature is a call for a better understanding of those who need information and the environment in which they function so that practically useful studies can be carried out (Dervin, 1983; Durrance, 1989; Mick, 1980; Paisley, 1980; Taylor, 1986; Wilson, 1981). Durrance (1989) recently pointed out that there is still a lack of a good theory of information needs that allows us to

translate information needs into meaningful information service components. Similarly, Krikelas pointed out earlier that a common theme of some of the ARIST chapters [entitled **information needs and uses**] is the lament that there is no single theory of information use (1983, p.6). Although there seems to be a relationship between information needs and information uses implied in the literature dealing with user studies, we have not yet looked at the relationship very closely. Even in the recent review of information needs and uses, Dervin and Nilan state: "...the alternative definitions of the two central concepts of information needs and uses research are now emerging -- information and information need" (1986, p.17), leaving the concept of information use unattended. As argued by Taylor (1986), we do not know very well what it means to 'get' information, and equally unclear what we mean by use or utilization of information.

Moreover, if information is more a tool than an end as suggested (Fine, 1984; Katzer, 1987; Wilson, 1981), what impact does the use of information and the way it is used have on the needs for information? What is the relationship between use and need in a specific context? The purpose of this paper is thus to examine the relationship of information needs and uses by literature analysis and to explore some factors that influence the relationship. The questions this paper tries to answer are: 1) Is there a relationship between information need and use? 2) If so, What kind of relationship is it? 3) What is the impact of different contexts on the relationship of information needs and uses? 4) What is the implication of the relationship in the development of better information systems and services? The paper begins with definitions

of terms followed by a discussion of relevant theoretical models that were identified in the literature. The factors affecting information needs and uses shown in the empirical studies will then be reviewed and discussed. A proposal for conceptualization of the relationship of information needs to use and some suggestions for future research conclude the paper.

Concepts and Definitions

Observers of user studies have long noted that both research and practice in the field suffer from the lack of a unifying theory of information need and use. This scarcity of theory can partly be explained by the complexity of need and use, and partly by the difficulty in defining such concepts. Several conceptual and definitional problems of important terms that appear in the user studies literature need to be addressed first.

Information and Information Need

Taylor (1968) describes information needs in terms of its specificity in cognition. At one end, there is visceral need (i.e., internal actual but unexpressed and perhaps inexpressible need for information); at the other end, there is expressible, well-defined need; and in the middle there is conscious need (i.e., realized, ambiguous and ill-defined description of the need). He recognized that a difference may exist between what a person perceives as a need and the way it is expressed. Although useful in understanding some nature of information need, the concept of information need is still far from clear and as a psychological state, it receives criticism of not being applicable in conducting useful research or to improve practice (Derr, 1983; Dervin and Nilan, 1986). In this

tradition, information is considered as an external entity with an objective nature, or that which informs or has the potential to inform; or a combination of content or meaning represented by symbols and media or conduit, used or usable in a particular context (Burk & Horton, 1988).

Dervin and Nilan (1986) in a comprehensive review of post-1978 literature on user needs and uses indicated the commonality in conceptualization of information and information need is emerging as the research paradigm shifts from system-orientation to user-orientation. The following definitions of information and information needs are mainly derived from their review article:

Information is: (a) that which is capable of transforming image structure (Belkin, 1978); (b) any stimulus that alters the cognitive structure of a receiver (Paisley, 1980); (c) any stimulus that reduces uncertainty (Krikelas, 1983). Similarly, information needs exist: (a) when the person's cognitive structure is not adequate to a task (Ford, 1980); (b) when a person recognizes something wrong in his or her state of knowledge and wishes to resolve the anomaly (Belkin, 1982); (c) when the current state of possessed knowledge is less than needed (Krikelas, 1983); or (d) when internal sense runs out (Dervin, 1983). Clearly, as noted by Dervin and Nilan, it is the cognitive approach that underlies research in the user-oriented paradigm in the last decade; i.e. information is something that changes cognitive structure, and information need is present when a gap, uncertainty, or anomalous state of knowledge in cognition is recognized. From this perspective, information seeking behavior can be defined as any

activity of an individual that is undertaken to identify a message that satisfies a perceived need (Krikelas, 1983, p.6).

Information Use

With few exceptions, information use is a concept which has not been clarified and is often left undefined. Elayyan (1988) quotes Brittain: "as most frequently it refers to the study of the gathering stage of use rather than the use to which information is put once it has been collected." In his own article, Elayyan considers information use as "what an individual actually uses" or "what an individual actually applies"; a use may be a satisfied need, or it may be the result of information seeking , browsing or accident (p.248). According to Dervin (1982), it is the ways in which people put answers to questions to work. For Kunz (1977), it is the actual frequency of use of particular information channels (journals, books, conferences etc.) by scientists and other professions. For Taylor (1986), information use can be any instance mentioned above. According to different approaches to conducting use studies, Menzel (1960) made a useful distinction as follows:

> When approached from the point of view of the individual scientist, these [use studies] are studies of scientists communication behavior; when approached from the point of view of any communication medium [or services], they are use studies; when approached from the point of view of the scientific communication system, they are studies in the flow of information.

Therefore, information use can be seen as a behavioral outcome from interaction with either personal or non-personal information sources.

More systematically, Wilson (1981) makes a distinction between information, information need, information use, information seeking, information transfer. He notes that the definitional

problem of 'information need' is partly the result of a failure to identify the context within which information needs investigations are carried out (p.5). He views that "the situations in which information is sought and used are social situations" (originally emphasized, p.9) and that needs for information could be better understood within situations such as work organization or social settings. He proposes that information needs should not be confused with other basic 'human needs' such as physiological needs, affective needs, and cognitive needs, and maintains that as part of the search for the satisfaction of these more fundamental needs, an individual may engage in information seeking behavior (p.8). He also maintains that an information source is used only in the sense of being evaluated to discover the relationship of the user's need (p.5). In other words, when information is used, a relationship obtains between information and the information purposes of the individual.

With the traditional view of individuals as information seekers, or driven to seek information for cognitive ends only, the importance of Wilson's proposal is that information is explicitly treated as a tool to satisfy either affective needs or cognitive needs or both (as opposed to an end in itself, and as opposed to purely cognitive conceptions of information needs). Along the same line, Katzer (1987) argued that information seeking and use is virtually a social phenomenon, therefore purely cognitive considerations will not be able to do very much. He suggests that what is needed are social variables which have the power to explain much of what occurs in information seeking and use (p.25). It is in this context on which the following discussion will be based.

Relating Information Needs to Information Uses: Three Approaches

Dervin and Nilan (1986) identified three approaches in conceptualizing user-oriented research on needs and uses. They are the anomalous states of knowledge (ASK) approach, the value-added approach, and the sense-making approach.

Belkin's Model

Belkin's ASK model (1982) does not focus on information needs but on people in problematic situations with a need for help from some kind of information system. In the ASK model, an information need is present when a person recognizes something wrong in his or her state of knowledge and wishes to resolve the anomaly in the problematic situation. People may bring with them an incomplete understanding of their needs even in information seeking mode. He implies that information is ultimately to be used toward solving the problems that creates the anomalous state of knowledge in users.

Taylor's Model

Taylor (1986) proposes the value-added model, focusing on the perceptions of utility and value that users bring to systems. In his approach, information needs are generated from users' problems in a task within their environments, which dictate the information uses. That is, needs for information are present when there is a problem to be solved. He maintains that information is to be used in relation to problem-solving.

Dervin's Model

Dervin (1982) proposed a sense-making model (Situations-Gaps-Uses) where she suggests that information needs are presented when

the internal sense of the person runs out in a situation causing an information gap. Information use is to make up the gap in the situational context.

The similarity among the above models is that they all see that situational contexts are important in the determination of needs for information, but with different emphases. Taylor emphasizes the organizational context (work), whereas Dervin is concerned with individual context (in daily life), and Belkin focuses on the context of users' interfaces with information retrieval systems (especially bibliographic information retrieval systems). Nevertheless, they all see the user's problematic situations as the central contexts that establish the criteria for judging the relevance of information. A closer look into the major contexts to which these three approaches have been applied - academy, workplace, everyday life situations - a relationship between these three models on a continuum of various information-related dimensions may be illustrated in Table 1.

At one end, in an academic environment, needs for information are more rational or have a cognitive orientation, the information needed is more abstract and formalized (i.e. recorded knowledge), and the degree of objectivity of the information is emphasized. In seeking information, more interaction with documents seem apparent, and information is to be used toward knowledge creation or innovation. At the other end, in a daily life situation, the needs for information may be generated more from affective needs, the information needed is more concrete in the sense of getting answers for immediate usage, and the interaction with formal documents seems to decrease in seeking information. Here, information is more

often used to make sense for "life routine maintenance" with a more subjective orientation. In the middle as in a workplace, properties of each dimension at the both ends are relatively equally apparent.

It is important to note that this illustration is not meant to be a general statement but rather a way to look at the different emphases in specific contexts. For example, the use of informal networks as important information sources among scientists is well documented (Crane, 1971). One may also reasonably argue that an information retrieval system is a smaller context that is embedded in our larger social context in daily life situations, and therefore the characteristics of various dimensions illustrated in various contexts are not different in kind but in degree. At any rate, it is in these different emphases that we begin to see the impact of "context" on information needs and uses and subsequent implications.

Type of information consumer	Researchers	Administrators	Citizens
Context of information need and use	Problem	Problem/Task	Situation
Major purpose of information use	Innovation		Routine maintenance
Characteristics of information needed	Knowledge Objective Abstract		Information Subjective concrete
Apparent information needs	Cognitive/Rational		Affective
Information sources	Formal documents		Personal dialog
Time for Information seeking within the context	Longer		Shorter

Table 1 Illustration of relationship between the roles of individuals in different contexts and the information-related dimensions

Impacts from Information Use Contexts

Wilson (1981) states: "If the full range of human personal needs is at the root of motivation toward information seeking behavior, it must also be recognized these needs arise out of the roles an individual fills in social life." (p.9). And one of the important contexts among other life world is "work role." Wilson identified seven factors in the workplace that could affect needs for information: the task performed, the processes of planning and decision making, the nature of organization, the individual's personality structure, the organizational level (position) and the organizational climate (p.5).

Taylor (1986) identified 3 major factors that influence information use in organizations: the organization as a whole, roles or functions of people, and problems that are generated by the people (pp. 35-36). As a whole, an organization's goals, demographic data, and clientele (which set direction and boundaries), management style, formal flows of information and work structure (i.e., organization structure) are identified as variables. He suggests that we should look at departments, work teams, offices, etc., as information processors as they demonstrate different and distinquishable concerns about information need and uses. For example, a functional view of organizational information needs can be derived on the basis of a five-part model of organizational structure. At the bottom, workers of the operating core need information which is simple, concrete/precise and immediate for

routine maintenance. At the top, administrators need 'trend' information to project the future within and outside the organization; information sources needed by this group of people are less predictable (Daniel, 1982).

By examining different types of professional settings in information terms and their general patterns of information use, Taylor illustrated differences between engineers, scientists and executives (Table 2).

	Scientists	Engineers	Executives
Goal is to produce:	documents	products or operating system	short-, medium- & long-term decisions
Nature of work:	research	focused direction of inquiry	monitor internal & external environments
	progress over long period of time & cumulative	work within time constraints	subjective judgement play an important role in decision making
Information Channels:	rely on formal system	prefer informal source	favor verbal media phone calls & meetings
Information need:	theory	reliable answers	options & alternatives
	source data literature		rely on evaluated aggregated data
			external information is critical but often unpredictable
Attitude toward information:	comprehensive coverage	minimize loss rather than maximize gain	must operate on less than total information available
	bibliographies helpful	standards, manuals important	

Table 2 Adapted from Taylor (1986), p.39-40.

Generally speaking, scientists have three common information needs: the need to keep up to date, the need for specific information that is relevant to the task at hand, and the need to find all the relevant information on a topic (Krikelas, 1983; Montgomery, 1987). The criteria of the information needed would be currency, accuracy, and exhaustivness, respectively. In terms of information seeking behavior, communication with colleagues (especially local colleagues) is very important. Journals, verbal communication, personal files, and conferences are ranked as the most valued information channels they turn to. More specifically, Garvey (1979) showed that the kinds of information channels used by scientists by and large depended on the nature of information needed in various stages of scientific work. Although the information sources needed may differ, similar findings also hold for engineers. Allen (1969) illustrates that the information needs of engineers vary greatly as engineers progress through a project. Using interviews and questionnaires, Montgomery's study (1987) of corporate scientists shows that work in an implementation phase suggests that they have a low need for bibliographic information and little time available to search, whereas scientists working in an innovative, investigative or basic learning phase have a higher need for bibliographic information and possibly more time made to search.

Scientists' information behavior in government research laboratories is even more different from that of their counterparts in corporate settings. Mick et al. (1980) showed that scientists in research settings spent roughly twice as much time on reading and in the library as their counterparts in corporate settings, and they tended to have more individual discussion than group discus-

sion. Their findings were consistent with Allen's (1966) results, that engineers and scientists are quite different in their information behavior. While information is ordinarily used by scientists to create new knowledge in document form, information is used by engineers to produce operational products, and by practitioners to get a job done in the workplace, especially in day-to-day problem-solving situations (Elayyan, 1988; Taylor, 1986).

Planners and decision-makers have programmable needs and non-programmable needs. Programmable needs refer to the needs for information for routine, repetitive decisions, where the criteria for decision-making are known and predictable in most cases. These are operating and control decisions concerned principally with monitoring current processes to detect differences with predetermined estimates of desired performance. There are well-defined information channels and structures to satisfy those decision needs. Non-programmable needs, on the other hand, are less predictable due to the uniqueness of the problems faced and the heuristic techniques needed for making a decision to solve the problem. Much of the information input in this latter case is informal and verbal. Therefore, planners' and decision-makers' needs are not structured according to "subject" in the usual sense of the term, but are essentially function- or task-oriented. Information is to be used for situation analysis, forecasting, policy-making, etc. (Taylor, 1986, p.41).

For the general public in daily life, Dervin noted: "if we look at the individual and his informing processes we can see that his functional unit is more likely to be response, instructions,

reinforcements, solutions, answers, ideas, assistance, wherever and however they may be found." (1975, p.12). In studies of the general public, data showed that the use of human resources as the source for meeting information needs (i.e., depending on other people) is second only to "own experience" for a majority of 646 Californians and 2400 residents of New England (Krikelas, 1983, p.9).

Even within a specific professional setting, distinguishable types of contexts similar to research, decision-making and daily life situations can be identified. Within the education profession, Eraut (1985) compared the different nature of knowledge use in three contexts - an academic context, a policy discussion context and an action context - using schoolteachers as an example and included the following observation:

> "The academic context is characterized by written communication in certain traditional formats: research papers and monographs for faculty, essays, examinations, and dissertations for students. The demands of these formats determine the general pattern of knowledge use. The possession of knowledge is demonstrated by specialized knowledge and multiple citation of other work. Standardized account of experiments or highly theoretical discussion is expected... But for students, the demonstration of their knowledge is private and its evaluation non-negotiable. In policy discussion contexts, however, knowledge use is public, and the validity of knowledge can be a matter of public debate. One has to relate to other people's ideas to make compromises and coalitions or to persuade people... Knowledge use by a team or organization involves not one but several people coming to understand, accept and internalize new ideas... and knowledge use in the policy discussion context requires specialized social and political skills... Finally, unlike the academic, the practicing professional is in a 'what ought to be done' environment, the aim is not knowledge but action. Moreover, they have to believe what they are doing, rather than question it because they take responsibility for the consequences. The result is an essentially pragmatic orientation which stress first hand experience in preference to abstract principles. So there is a certain subjectivism in the approach, a skepticism about 'book learning' and a belief in the individuality of each distinct case." (pp. 127-128)

Eraut's observation shows how various settings may affect the needs for knowledge/information in different formats and the ways in which knowledge/information may be put to use. It tends to confirm that there is a decreasing reliance on formal (generally agreed and shared) knowledge and an increased tendency to seek sense-making information (i.e., individual meanings, as opposed to group meanings) when one moves from academic context to action context, which often requires timely response to a situation. One may hypothesize that if one can identify common characteristics of a context and people within the context can be identified, one may be able to predict certain information needs and how information may be used.

Due to the different nature of the three contexts, Holzner and Salmon-Cox (1984) pointed out that from a sociological viewpoint different types of knowledge syntheses are needed to facilitate knowledge use from setting to setting, such as the research environment or the institutional domain. In their discussion, the research environment emphasizes information need for theory-building; the policy-making environment focuses on information that is useful for problem formation & decision-making; while in the workplace, information is needed for problem-solving in daily practice.

In sum, it is clear that needs for information are contextually bound. There seems enough evidence indicating that the need for information is better understood through the users' problems or tasks at hand, the situations they encounter and the environments they are in. The more specific a context we define, the more useful findings about information needs and use behavior we may have.

Katzer (1987) argues that the challenge for information scientists is to determine how to categorize settings and topics so that the effects of information vary systematically, and can therefore be usefully studied. Analogously, having identified various problem dimensions and information traits, MacMullin and Taylor (1984) suggest that the organization of information should go beyond subject-orientation or content-driven as in existing information systems to accommodate problem dimensions, which need to be linked with information traits. Furthermore, Kuhlthau (1988, 1990) identified and characterized various problem states over time within the information seeking process. She also proposes that computer information systems be integrated with the user's problem state permitting a match between information and the different stages of information need (p.302).

Common Factors of Information Uses

Based on the above discussion, two types of information use are implied: individual use (as in the personal situation) and organizational use (as in the workplace). Correspondingly, there are individual users and organization users. What and how information sources or services will be used depend on the user's capacity to use information. User capacity is defined as "the ability to assemble his own internal resources and to call upon outside help" (Havelock, 1969; cited in Hensley & Nelson, 1979). Certain individual and organizational factors that affect the user's capacity to use information can be identified. At the individual level, attitudes toward innovation, market segmentation variables,

information seeking behavior and types of information needs are included. At the organizational level, the factors include organization structure, organization climate, leadership, and organizational environment (Hensley & Nelson, 1979). These and other factors, as discussed below, may be potential obstacles to information utilization.

Factors relating to information use at the individual level:

(a) **Users' Cognitive Skills.** It has been suggested that users' self-servicing skills, such as problem-solving skills, need awareness, need expression abilities, the ability to seek out information, and the ability to adapt and integrate solutions, are important in determining a user's capacity to use information (Hensley & Nelson, 1979). These skills for the most part are related to cognitive factors. As Paisley (1980) pointed out, studies have shown that people have different information-processing (cognitive) styles which will affect their information use patterns. He argues that unless we know how people 'differentiate' and 'label' mental constructs, their tendency toward 'field dependence', or whether they tend toward 'serialist' or 'holist' thinking, etc., individual differences in information use may seem random (p.133). However, it is also recognized that such cognitive variables are difficult to study and may not be controlable from the information manager's point of view (Mick et al., 1980).

Nevertheless, the effect of certain cognitive variables on the use of specific information sources has been investigated. In a large-scale study of online searching, Saracevic et al. (1988) used standard mental instruments and found that online searchers' cognitive traits, such as learning style and word association

ability, are influential in information retrieval performance, as measured by precision and relative recall. Similarly, Borgman (1989) found a strong relationship between students' academic orientation indicated by technical aptitude and learning style, and information retrieval performance. Borgman concluded that newer information retrieval systems should be designed so that people with different cognitive styles can easily find their own ways to search the information when interacting with the system.

(b) **Users' Attitudes.** A person's past experience, value system, and personality, etc., form his or her attitudes about using certain information sources (Hensley & Nelson, 1979). In a study of corporate scientists and technologists, using questionnaires and interviews, Montgomery (1987) found that users' positive and negative perceptions of information sources were important in determining what information sources they were most likely to use. In a study of the use of information sources by 1032 educators, Summers et al. (1983) showed that more positive attitudes toward information (measured by a 15-item scale for affective response to information for each of the five stages for attitude development: perceiving, responding, valuing , organization and characterization) correlated with a higher reported frequency of use for most information sources. Their data supported the hypothesis that "source use is predictable from attitude" (p.79). The same study also indicated that desirable characteristics of information (e.g., near at hand, easy to use, reliable, etc.) are predictable from 'attitude' toward information (p.83). Paisley (1980) also reported that attitude is an important

determining factor in the use of information sources (modes and channels).

(c) **User Motivation.** This factor holds in both individual use and organizational use. The presence of incentives such as recognition, rewarding through award (e.g. in the form of money), regulation and policy, and training tend to encourage information use (Hensley & Nelson, 1979). For example, Some studies showed that unrestricted long-distance telephoning correlated highly with success in obtaining information (Paisley, 1980, p.147). Data from 79 scientists and engineers in Wolek's study (1986) indicates that managerial support in the forms of encouragement of interpersonal contacts outside the organization such as visits, conferences and courses, and personal interest in specific pieces of information as shown in routings, personal example, and assignments are most influential in the individual use of information services for scientific and technical information. In addition, some studies showed that the user's awareness of information sources (including personal and nonpersonal sources), accessibility and availability of information resources have provided motivation for information use and are influential in information seeking behavior (Elayyan, 1988; Krikelas, 1983; Summers et al., 1983).

(d) **Market segmentation.** A market can be segmented according to geographic variables (e.g., city, distance, etc.), demographic variables (e.g., education, occupation, age, etc.), and psychographic variables (e.g., life style, user status, etc.). It is pointed out that some parts of the actual market will have more interest and more resources and will be more responsive to the information product or service than others (Hensley & Nelson,

1979). Although this may be true from the marketing point of view, counter findings are also presented in the empirical studies. For example, Atwood and Dervin (1981) studying race and other demographic variables such as education, age, income and sex in information seeking behavior argue that the situational variable is a better predictor for information use than those demographic variables under investigation. The findings in the study of Summers et al., however, indicated the effects of the education level on the use of sources such as types of libraries and types of publications used (1983). The inconsistent findings may be attributed to the different study design and information sources under investigation. Nevertheless, some studies showed that certain type of services attracted people in certain segment. For example, intermediary online searching is mostly used by faculty and least used by undergraduates in the education environment (Anders & Jackson, 1988).

(e) **Information seeking behavior.** Based on the previous discussion, it should be apparent that information seeking behavior can be affected by contextual variables such as user's organization type, positional variables such as type of work performed, and personal variables such as age and education level.

Kuhlthau (1988, 1990) proposes a six-stage model of information seeking process. Her findings indicate that information seeking behavior in libraries is closely related to the users' problem state. As the problem state changes from task initiation through prefocus exploration to search closure, the action changes from seeking relevant information to seeking pertinent information, and so do the search strategies change accordingly. The same

studies also showed that habitual approaches to searching were evident as were common experiences of cognitive and affective symptoms in the search process.

As part of common experiences, it has been found consistently that people are in favor of oral communication as the first step in seeking information and tend to apply the least effort principle (i.e., to minimize individual and organizational time and money in seeking and interpreting information) in various contexts (Allen, 1969; Elayyan, 1988; Montgomery, 1987; Osiobe, 1988; Paisley, 1980; Summers et al., 1983; Raitt, 1985). These studies show that people tend to use most convenient sources such as personal files and materials available on hand. Although recognizing a strong preference of human face to face communication among scientists and citizens as implied by least effort principle, Krikelas (1983) noted that some people for psychological reasons such as need for privacy may not apply the concept of 'least effort'. On the other hand, Wilson suggested that the choice of oral channels over written channels may well be guided by affective needs as much by cognitive need (1981, p.9).

In addition, most studies indicate explicitly or implicitly that characteristics of information systems and sources (such as ease of use, coverage, authority, timeliness, etc.) also affect information seeking behavior. Along with the development of information technology, various information systems have been introduced into more and more organizations. However, controversial findings of their impacts (both negative and positive) have been reported (Kling, 1980; Er, 1989). Their full impacts on human information seeking behavior still wait to be seen.

(f) **User needs.** The type of work or task performed, and discipline or profession have impact on users' information needs. The difference of users' needs for information between different disciplines, in various disciplinary/professional settings, in various stage of a task for problem-solving, decision-making or sense-making have been well documented by many researchers (Allen, 1969; Crane, 1971; Gould, 1988, 1989; Kuhlthau, 1988, 1990; Montgomery, 1987; Osiobe, 1985; Paisley, 1980; Saks, 1980; Stone, 1982; Summers, 1983; Taylor, 1986; Wilson, 1981).

Note that some of the variables, such as type of work performed, have impacts on each factor. It seems that these are interrelated factors which might imply causal relationships among themselves. It leads to a hypothesis that people in a given market segment (e.g., with similar demographic characteristics) may have some similar information needs. Within a more specific market segment (e.g., in the same profession or discipline working in the same organization), people who share similar attitude toward information may have similar information seeking behavior, which in turn leads to the similar use of information. For example, the concept of invisible college (Crane, 1971) and some findings from the studies of work group might be a clue of this hypothesis.

Factors relating to users' capacity at the organizational level:

(a) **Organization structure.** Size of the organization, the degree of centralization and architecture, such as office layout, have effect on communication pattern and information flow within an organization (Allen, 1969; Hensley & Nelson, 1979; Paisley, 1980). For example, some empirical studies showed that formal structure of the organization exerts a significant influence over both technical

discussion pattern and the flow of critical information influencing the conduct of research project (Allen, 1969). In addition, work structure in the forms of departments, work teams, offices etc. suggests varying criteria, need for and dispositions toward information in each of these units as information processors (Taylor, 1986, p.38). Consequently, mapping information resources in an organization according to organizational units for better utilization has been suggested (Burk & Horton, 1988).

(b) **Organization climate or culture.** Wilson noted that controversial findings are presented in the studies of organization climate in relation to use of information (1981, p.14). The controversy may be due to the fuzzy concept of "organization climate", which is very likely defined differently by individual researchers. Some variables under investigation including individual autonomy and leadership are found to be influential (Hensley & Nelson, 1979). High autonomy (Paisley, 1980) and various forms of managerial supports for use of information services (Wolek et al., 1986) tend to encourage information seeking and uses.

(c) **Organization policies.** As noted before, unlimited long distance calls as a policy or an incentive will encourage workers to seek out information (Paisley, 1980). Policies that encourage professional activities such as attending conference meetings are another example (Wolek at el., 1986). Problem-solving procedures as specified in the organizational policies or sometimes implied in the management style also affect information use behavior (Taylor, 1986). For example, the respondents in the study of Mick et al. (1981) indicated that their major need was to keep aware of developments and activities in their fields, but management

policies tended to discourage this type of information activities. As a consequence, less time spent in such activities was reported.

(d) **Organization environment.** Nature of the organization, its goals, and its clientele are identified by Taylor (1986) as environmental variables that affect information use within the organization. For example, the greater the extent of organizational interface with innovations the greater use of information may be expected. Specifically, Hensley & Nelson (1979) pointed out that budgetary consideration as an environmental factor is influential in the extent of information resources made available within the organization.

It should be noted that information use in daily coping is more affected by individual factors than organizational factors even though one may reasonable argue that individuals are still living in another type of organizations such as family. Nevertheless, as the role of individuals changes from one context to another, information need and use change accordingly. On the other hand, information need and use by individuals working in an organization is affected by both individual and organizational factors. However, discontented with the findings of research that focused on the individual and the individual as an information seeker, Mick and his associates (1980) emphasized information needs in a task and work environment in general. They summarized the variables that affected information behavior in the past studies in three dimensions as follows. The first dimension is individual attributes including demography, training and professional background, organizational role and function, attitudes related to work and profession, attitudes related to the value of information.

The second dimension is work environment attributes including organizational demography, work teams, communication networks. The third dimension is task attributes including basic versus applied, diffuseness of the task, rate of obsolescence of information, phase of the project, criteria for satisfactory completion of the task. Mick and his associates argue that the variables investigated in previous studies can not be controlled or manipulated by information managers. Instead, they proposed a conceptual model of information seeking, showing that a stimulus, generated within the context of a particular situation which occurs within an environment and a set of attitudes, generates an information need. The need, which leads to a specific action including use of information, may be refined or satisfied after the evaluation of the result of information use (p. 348 and p.352). Among others, their research findings from the study of scientists' and engineers' information behavior support the hypotheses that 1) task **need** is predictable from **situation** variables 2) **task** need is predictable from **environment** variables 3) **environment** variables are predictable from **situation** variables 4) **action** variables are predictable from **need** variables. Similarly, Summers et al. (1983) found that information sources use is predictable from educators' position in schools. Note that information sources in both studies included various communication channels such as conversations with colleagues and documentation sources such as journals/research reports.

Many authors argued that a distinction should be made between information gathering and information utilization (Elayyan, 1988; Krikelas, 1983; Tetlow, 1983; Wilson, 1981). For example, some

studies of the gathering and actual use of information in organizations show that most organizations and individuals often collect more information than they use or can reasonably expect to use in the making of decisions. Yet, at the same time, they appear to be constantly needing or requesting more information, or complaining about inadequacies in information (Tetlow, 1983). Among others, those studies indicate that 1) much of the information that is gathered and communicated by individuals and organizations has little decision relevance; 2) much of the information that is used to justify a decision is collected and interpreted after the decision has been made, or substantially made; 3) much of the information gathered in response to requests for information is not considered in the decision for which it was requested; 4) the relevance of the information provided in the decision-making process to the decision being made is less conspicuous than is the insistence on information (March, 1982). March challenged the unstated assumption of rational decision making model that

> "Relevant information will be gathered and analyzed prior to decision-making. Information gathered for use in a decision will be used in making that decision. Available information will be examined before more information is gathered or requested. Needs for information will be determined prior to asking for information. Information that is not relevant to a decision will not be gathered" (Feldman and March, 1981, p.172).

Other authors also question the assumption of 'planful' use of information in workplace (Paisley 1980; Saks, 1980). It is suggested that organizational decision-making depends as much on political factors as logical ones, and that information relevant to negotiation, power, opinions, cost etc. should be provided in relation to the decision-maker's intention and perspective (Eraut, 1985; Holzner & Salmon-Cox; March, 1981; Tetlow, 1983, Katzer,

1987). One may reasonably argue that the same viewpoint may be applied to individuals as well.

As noted above, information use is usually treated as an aggregated concept without differentiating level or kind of use. However, use of information is not necessarily a simple concept as such. Paisley noted that there were five functions of information: learning, decision-making, problem-solving, calculation, verification (1980). In an educational context, Eraut (1985) discussed four modes of knowledge use: replication, application, interpretation and association, and argued that to move from one mode to another requires other intellectual effort and that different mode of knowledge use may be required in different contexts as mentioned before. Moreover, to determine whether an innovative treatment is implemented, Hall & Loucks (1977) identified eight levels of information use: non-use, orientation, preparation, mechanical use, routine, refinement, integration and renewal. It is not clear what factors affect the level of use and why. One can only speculate that depending on the task situation and environment that generates information needs, there might be a process of moving information use from one level to another level as information need is satisfied or refined after previous use of information (Kuhlthau, 1988, 1990). Nevertheless, what is still missing is how people really make use of information after they interact with information sources (personal or non-personal) to meet or change their information needs that initiated the seeking behavior. At this point, we are still in a primitive stage in understanding the relationship of information need and use.

Discussion

As we see it, at the macro level, contexts define information needs, information seeking behavior, and information use. As such, they define the characteristics of information needed, user communication / information seeking patterns, and information uses. At the micro level, information use is for the most part also a personal matter that is influenced by many factors. At the same time, the characteristics of information sources also determine when and how information is to be used.

Based on the above discussion, the key elements and processes of human information behavior within a given context can be conceptualized in three ways. In model A, information use is the destination of a process starting from a user with an information need going through information seeking, gathering, and evaluation stages. At the information seeking stage, the user looks for an information system such as a person or a library where s/he can start gathering information. At the gathering stage, s/he explores alternative information sources such as engaging a conversation with a person or use of indexes, journals etc. or all of them. S/he eventually has to evaluate the materials or information collected and decide what and how to use them or give them up.

Model B shows the dynamic aspects of the process. The user's need may change during the information seeking process. For example, a student intending to collect materials on Shakespeare for a class assignment may change his or her topic after being aware there is too much to deal with or decides to focus on only one aspect, which is not as originally planned. As another example, online information retrieval studies show that users may change their information needs during the relevance judgement of citations

retrieved. Sometimes they may come back to search with a more focused topic after going over some of the sources identified from the preliminary results. That is, change of the information need may occur after the user uses part of the materials s/he collected. Therefore, it is entirely possible that the process of needs initiation, information searching and uses is an ongoing process through interaction between the three components. An interesting research question may be how information use in the previous stage affects the original information need and the following information seeking behavior.

Model C, as suggested by Mick et al. (1980) and Summers et al. (1983) shows a possible causal relationship between needs for information and uses of information. If the variables are carefully defined, one may usefully test out the hypothesis that within a specific organizational context, information use can be determined by the presence or absence of reinforcement among individual and organizational factors of user's capacity and resources available.

Conclusion

The literature reviewed has pointed out some important factors that may influence respectively the information need and information use in a specific context. However, it is still not very clear what variables within each factor are most essential to relate information use to information need, and without a general theory of information need and use, equally unclear is why some relationships between variables might hold. Studies of demand and needs have predominated as well as the use of information channels. Less frequently studied are the actual uses of information and

information overload in terms of environmental and situational factors.

The lack of research in the actual use of information makes it difficult to understand what information people really need and how information used previously influences the information need or information seeking behavior that follows. Therefore, it is also difficult to evaluate how and to what extent the impact of information services or systems on fulfilling information needs. As Katzer (1987) argued,

> "it has been assumed that information use is a direct consequence of information need, that information behaviors are solely intellectual activities, and that information is an end unto itself. However, in a world of information overload, limited time and interpersonal pressures, it is difficult for us to achieve optimal rationality - even if that were the best way to resolve the situations we face." (p.19).

Indeed, the problem with information overload is a generic conern in user studies in general (Durrance, 1989; Saracevic et al., 1990). It is suggested that more research be done to discover why people need information and what uses they will make of the information if they get it.

Katzer's point also leads to another factor that is seldom taken into account in studies of information need and use. Time is almost never considered, with the exceptions of Dervin's work which deals with the information needs of average citizens through time and space, and Kulthau's work which investigates the information seeking and use of library users over time. Time is an important factor in determining the needs and uses of information in two ways: (a) a time-line in a task implies different information needs; (b) the immediacy of the information need and the amount of

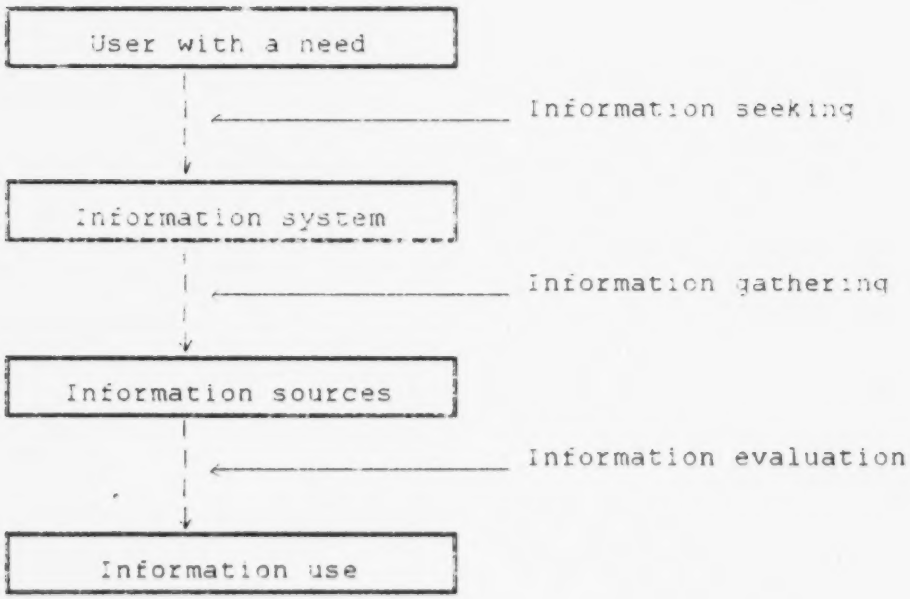
time available for seeking information. If information is to be used to fulfill needs, to solve problems or accomplish tasks or make sense in a situation, the effect of passage of time is an important factor to be adopted in further research.

Moreover, the populations studied tend to focus on a few special professionals such as scientists and academics. More studies are needed to examine information behavior of laypeople, managers or other professionals.

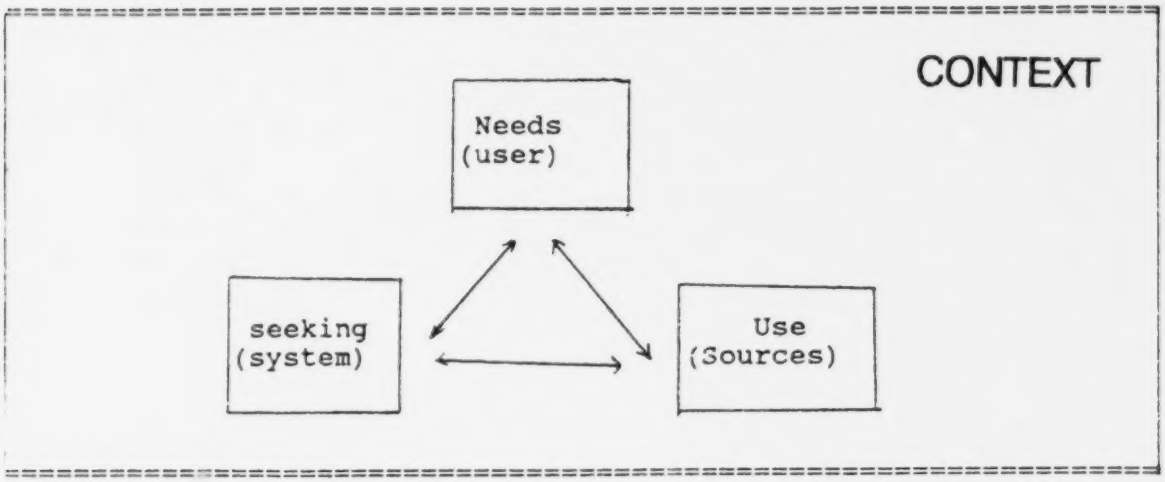
Based on our discussion, with current existing information systems, only the subject component of the need is met. The format in which they are met and the perspective the resulting information takes, and the variations of any of other non-content dimensions of information as discussed are rarely considered. This may explain why individuals as an information source are preferred by most people. If human-to-human communication is preferred as an ideal information channel as shown in most user studies, studies on how information from people is used in conjunction with information system and what characteristics of oral communication can be implemented in a computer-based information system may be helpful.

As we look at different populations, knowledge of the user as a person who has many roles and is a member of many microcultures will be valuable (Katzer, 1987; Paisley, 1980; Wilson, 1981). More attention to meanings, cognition, intention, oral interactions and informal systems as well as the general effects of the user's culture and the specific effects of the user's unique spatio-temporal setting will be needed to provide a meaningful context so that human information behavior can be usefully studied and better understood.

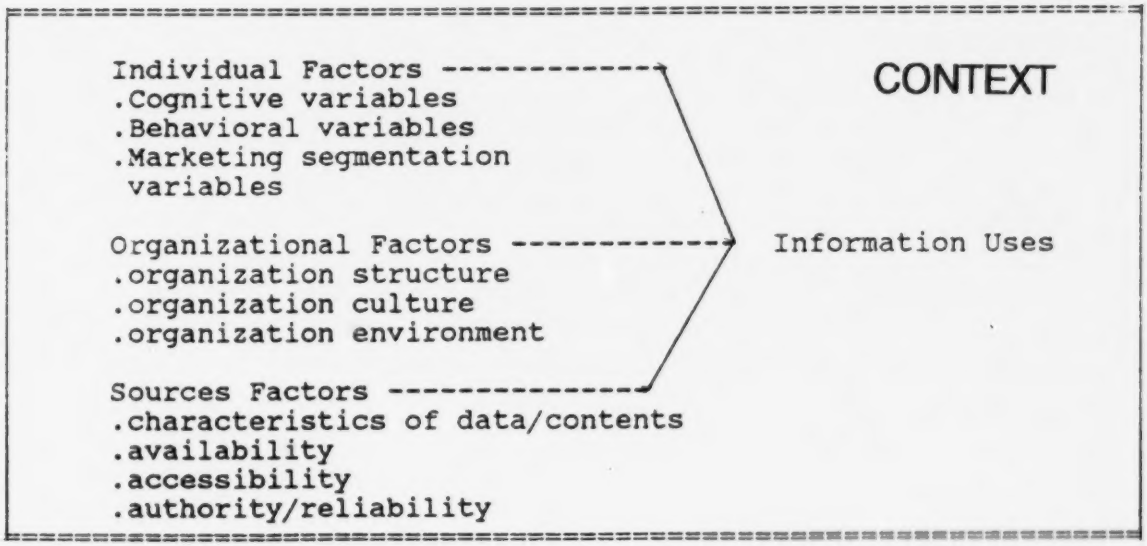
(A) A Linear-Processing Model



(B) an interactive model:



(C) Causal Relationships



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